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The Effect of Nutritional Education on the Food Habits of High School Students

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THE EFFECT OF NUTRITIONAL EDUCATION ON THE FOOD HABITS OF HIGH SCHOOL STUDENTS

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Gladys C. Hyer

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

"From the day that Adam and Eve shared an apple in the Garden of Eden, food and the partaking of food have been of infinite significance in the life of man." (Kinder, 10)

There is a growing concern among nutritionists and others about the food habits of teen-agers. Although the United States is considered to be the best fed nation in the world, there is an important group of our population, about 16,000,000 teen-agers, who have alarmingly poor food habits.

Parents know that their teen-agers, especially the girls, are erratic eaters. The pressure of outside activities of school and church leave little time to eat regular meals in a leisurely manner. School lunch personnel report that many students have "finicky" appetites and do not make a good choice of food. Studies of students' school lunch habits indicate that vegetables are returned as plate waste more frequently than any other types of food. It is a well known fact that to many teen-agers and others, vegetables and salads are "rabbit food." The consumption of vitamin and mineral rich vegetables is lower than desirable among the population as a whole. Doctors know that emotional stresses and strains help to rob young people of a desire to eat. The military service is well aware of the results of poor nutritional habits, as numerous men have to be rejected for duty because of weaknesses due to nutritional inadequacies in earlier life. Some of the girls have difficulties during pregnancy which are traceable to previous years of poor nutrition. At this age other factors

are more important to the teen-ager than health. The girls particularly are weight conscious. The fashion for slimness has paramount influence on their eating habits. Their knowledge of food values is so inadequate that partial starvation is accepted as the way to avoid overweight. For both boys and girls, getting a few extra minutes of sleep in the morning becomes more important than eating a good breakfast, and social snacks dull the appetite for regular meals. The results of a dental survey made throughout Utah schools showed that students at North Cache and South Cache High Schools had more dental caries than any other group of students in the state. There seems to be a relationship between dental caries and the type and amount of food eaten.

Many teen-agers eat an inadequate breakfast or none at all, sweet snacks replace a noon lunch, and basic nutrients are often lacking in the day's total diet. Such conditions have been found to exist in Utah in a study made by Wilcox and Galloway (30) in Ogden, Utah in 1954. This study showed the diets of teen-agers in the 13- to 19-year-old group to be deficient in calcium, vitamin C, and iron. Another study made by Galloway (5) in 1954 indicated the average intake of green and yellow vegetables and milk to be lower for most groups than is recommended in the "Basic Seven." Surveys in homemaking classes also support these findings.

Food is one of the most important single influences on the child's health. It affects his ability to learn, his rate of growth, his appearance, his vigor, and indirectly, his achievement and happiness.

> Teen-age is a period of growth and terrific physiological development. This rapid growth puts extra stresses on the body. When the right kinds of food do not compensate for these stresses, there is failure of some sort. Lack of almost any essential nutrient can have a retarding effect on growth. (20)

It has been well established that a great many teen-agers have poor food habits, but what can be done to bring about the desired change, is a pertinent question. The eating habits of these people are a challenge to nutritional education.

It was believed that if teen-agers were made aware of the facts, they would be willing to cooperate. If they could be convinced that eating foods which furnish the necessary nutrients will result in better skin condition, better bone mineralization, optimum weight, and more pep and vitality, they might be willing to make some changes in their eating habits. This study was undertaken to determine whether or not education would result in better eating habits among teen-agers.

This investigation attempted to evaluate the food habits of approximately 400 teen-agers at North Cache High School in Richmond, Utah, and to determine the effect of nutrition education in bringing about desired changes.

REVIEW OF LITERATURE

The Importance of Nutrition

The powerful role of food and nutrition in the world today was recognized when the Foods and Agricultural Organization was activated as the first special service of the United Nations (12). The first chairman, Sir John Orr, was awarded the Nobel Peace Prize in 1949 for his contributions toward solving world food problems. He worked with the conviction that only when every nation is well fed and thus the people have positive, buoyant health can there be lasting peace between governments.

Teen-age is a period of growth and terrific physiological development. This rapid growth puts extra stresses on the body. When the right kinds of food do not compensate for these stresses, there is failure of some sort. Lack of almost any essential nutrient can have a retarding effect on growth (20).

> Together the Pennsylvania and Texas studies provide something long missing--convincing, telling information to motivate wider interest in nutrition in action. Even the teen-agers, often a doubting Thomas, now can have the kind of proof that makes sense, facts and figures on the tangible improvements possible in such vitally important areas as correct weight, skin beauty, better bone mineralization, greater vitality and well being.

Sherman (22) has said that nutrition is a subject that appeals both to the spirit of wonder and the spirit of service. Nutrition education has been more effective in revealing the wonders of nutrition than in bringing the everyday application to the betterment of mankind. With the growing appreciation of the importance of nutrition

education and the development of better understanding of the basic problems of teaching nutrition, progress may be expected.

Hippocrates, the "father of medicine," wrote of the importance of food in health about 400 B.C. In the "History of the Science of Nutrition," he thought food held a single necessary substance--a nutrient. About 1834, an English chemist, Prout, discovered that foods could be separated into three elements--carbohydrates, fats, proteins. In 1906, Sir Fredrick Hopkins discovered "accessory growth factors." These were named vitamines in 1912 by Casimer Funk. By 1950, some 50 to 60 essential nutrients had been isolated and the end is not yet reached. Stare (24) also says:

> The promise of a longer and happier "prime of life" for millions of Americans is the promise from better nutrition. Today in America where we have control and prevention over those diseases caused by improper sanitation such as typhoid fever, and where we have such wonder drugs as penicillin and aureomycin to combat the ordinary infectious diseases such as pneumonia, nutrition stands as the single most important factor affecting our personal well being and that of our families, neighbors, and friends.

Widdowson (29) made an interesting comment related to weight when he stated that a fat mother tends to have a large, fat baby. He felt that a big baby born of a fat mother seemed to be endowed with something which made it continue to eat in proportion to its size. Thus, eating a little more kept these children ahead of their fellows. They might or might not get fat during the growth period, but whether they did or not, they tended to reach puberty at an early age and with a heavy weight.

The Institute of Home Economics in "Essentials of an Adequate Diet," (1) states that many kinds of food nutrients must be provided for health. To help the consumer in selecting the necessary amounts

and kinds of food, a guide has been developed by nutritionists. This daily food plan has four basic food groups.

Group 1 is the milk group which includes milk and other dairy products. This group is our leading source of calcium which is needed for good bones and teeth. It also supplies protein, riboflavin, vitamin A, and many other nutrients. Two to six cups of milk a day and other foods from this group are required for adequate nutrition.

Group 2 is the meat group. This group includes meat, fish, fowl, eggs, with dried peas, beans, and nuts as alternates. This group provides protein, iron, thiamine, riboflavin, and niacin. An adequate amount consists of two or three servings of the following: meat, fish, or poultry, eggs, cooked dry beans, peas, or lentils, or peanut butter.

Group 3 is the fruits and vegetables group. These are rich sources of vitamins A and C and roughage. They add eye appeal, texture, color, and flavor to the day's diet. At least four servings are required daily. Of these servings some containing large amounts of vitamins A and C should be consumed. One serving of potatoes should be included.

Group 4 is the bread and cereal group. All enriched or whole grain breads or cereals are included. This group supplies protein, iron, several of the B vitamins, and energy. Four servings or more are required daily.

Butter and sweets are not included as it was thought that people will consume these foods in sufficient amounts without being told to do so.

Nutritional Status of Adolescents and Others

Studies made throughout the United States indicate that the quality of the food intake of large groups in our population is far below the Recommended Dietary Allowances as set forth by the National Research Council (21).

The Pennsylvania Mass Studies in Human Nutrition (20) indicate that even though America from infants to old people is the best fed nation in the world, there still is an important segment of our population, about 16,000,000 teen-agers, who are not eating properly. A ten year collection of dietary and nutritional status data on 2,436 boys and girls was analyzed. Lack of sufficient food and lack of the right food did serious damage--retarded growth, affected appearance, and undermined endurance. Since the Pennsylvania study made it clear that teen-age girls, rather than boys, present the most alarming picture and have the poorest food habits, the second phase of this study, which was done by the Texas State College for Women, was devoted to girls. A special optimum diet varying in fat levels only was used for 122 college girls for one year. The results showed that good nutrition made a difference in better health, better appearance, and better human beings (20).

Kirk (11) indicates that the average amount of food which entered kitchens throughout the United States was adequate to provide more than the recommended allowances for calories and for eight nutrients studied. Even so about three households in ten did not have diets which met the recommended levels. The nutrients most often supplied in less than recommended quantities were calcium and vitamin C. However when compared to an earlier survey in 1936, diets seem to have

improved considerably. In 1936, 33 percent of the households studied were rated as having poor diets, only 10 percent fall into that category at the present time. The enrichment of grain products and the increasing consumption of milk and meat seem to account for much of the improvement.

"They Never Suspected" is the title of a study conducted by Kiene (9) which gives a picture of the nutritional status of typical American families before and after a regimen which included better balanced dietaries and instruction on better handling of food and improved kitchen management. The subjects were 64 families in apparent good health who followed the regimen for one year. The project did result in improvement. There were fewer colds, better child growth, and improved weight status. The study revealed that adult females made the worst showing from a nutritional standpoint before the experiment. Teen-age girls were much the same.

Usher and Cooley (26) stated that teen-agers are found to be undernourished among low, medium, and high income groups of people. This isn't due to an occasional meal skipped or to an occasional taste treat of low nutritional value but to the day by day inadequate intake of essential food elements needed for growth and development. Individual group studies indicate that only about one-third of American youngsters have consistently good diets. Breakfast generally fares poorly.

The shortcomings that make for undernourishment in a land of plenty are numerous. Finicky appetites, excessive intake of one favorite food, and slighting of non-sweet food and foods that require chewing have a tendency to crowd out essential foods. Many mothers are too harried or too hurried to practice good nutrition themselves.

The inadequacies in food nutrient intake occur most frequently for proteins, iron, calcium, vitamins C and A. A good breakfast would help correct these inadequacies. All too often the teen-ager's breakfast doesn't contain enough food or the right variety to constitute a good breakfast.

The adolescent girl needs approximately 200 more calories than her mother each day and an adolescent boy about 800 more than his father. Their need for protein equals that of their parents. The teen-ager feels perfectly capable of choosing his own food, which he may not do wisely. He often uses too many sweet snacks and follows the tribal customs of his group in his food choices. These factors all help to result in poor food intake. Actually three meals a day is not enough for the teen-ager. He needs an after school and before bed snack, but these snacks should be planned to furnish some of the much needed food nutrients. Many teen-age girls in trying to keep slim do not eat as they should.

Dietary studies that have been made of the nutrition of school children in 19 states have been summarized by Pattison, et al. (19). Even when families are known to have adequate food supplies, it can not be assumed that all the members have a good diet. The diet of all family members did not necessarily conform to the Recommended Dietary Allowances. The mother and the adolescent daughters were likely to have the poorest diet within the group.

These studies have shown that many children do not have enough milk and green and yellow vegetables. Indications were that vegetables were not popular with children. Girls ate vegetables more than boys, but boys on the whole had a better diet than girls.

In a Montana study (14) of food choices of teen-agers, it was found that many students were not consuming satisfactory amounts of all the essential nutrients. Six out of every ten boys had an adequate diet, but only two out of every ten girls were eating desirable amounts of all essential nutrients. Deficiences were noted in calcium, ascorbic acid, iron, thiamine, and riboflavin intakes. In general, the girls in this study ate about two-thirds as much as did the boys. There were some girls, however, the weight conscious ones, who ate very little. They had cut down not only their calories, but the important nutrients they needed. The nutrient needs of the girls, except for calories, were similar or only slightly less than those for the boys. Physical symptoms due to low nutrient intake were also evident (18).

Whitehead (28) also found that teen-agers have poorer food habits than younger children and that the adolescent girl tended to rate lower than the adolescent boy. She felt that teen-agers' food habits hold a challenge to all persons interested in health education.

The nutritional status can be found by noting deviation from desirable weight, the condition of the teeth, clinical examination, biochemical tests, dietary history, and medical history, but perhaps the dietary history or food survey is the most practical index for teachers.

Galloway (5) determined the contribution of each meal to the adolescent's total nutrient intake with emphasis on children eating school lunch as compared to those not eating school lunch. Seven-day dietary records of 84 adolescent girls and 68 adolescent boys from Logan and Wellsville, Utah, Junior High Schools were evaluated to determine nutrient intake and the contributions of the various food

groups to the children's daily diet. The contribution of the noon and other meals was also reported. The girls were found to be in poorer position than the boys in respect to their nutrient intake. In general, the school lunch children showed a better position for most of the nutrients than the children who did not receive a school lunch. The average serving of milk and green and yellow vegetables was lower for most groups than is recommended in the "Basic Seven." Iron and ascorbic acid were the nutrients found to be deficient for the largest percentage of several groups of children.

The nutritional status of people in seven western states was summarized by Wilcox and others (31). Eleven hundred thirty-four, seven-day diet records were used. The subjects were people of all ages. Ascorbic acid was the nutrient found most apt to be low in the diets of the children and adolescents although the diets of the adolescent girls were equally low in calcium and iron. Similar findings were reported by Smith, et al. (23).

Because of tendency toward early marriage, teen-age girls need to be well-nourished in order to undertake the task of motherhood (6). Huncher (7) tells us that if mothers were in nutritionally adequate condition prior to conception and received a good diet during pregnancy and lactation, maternity would be safer and children would have a better start in life. The stresses of pregnancy as well as unfulfilled nutritional needs during childhood may cause a condition of deficiency soon after the onset of pregnancy. Indications are that the duration of the inadequacy of food intake for years previous may have far reaching effects.

Research indicates that breakfast-skippers rob themselves of potential alertness and efficiency during the morning hours, and that

dieters are wrong if they think missing breakfast is a practical way to reduce (27). Nutrition education was found to be exciting when it was personalized to the student's immediate needs. It was found that students performed best when food was distributed among three meals rather than two. In the Utah studies (5) only one child in five who had a poor breakfast was able to compensate for it in the total day's diet.

A study of 262 Utah school children with and without a history of rheumatic fever, made by Wilcox and Galloway (30), showed low intakes of calcium, ascorbic acid, and iron. Children under ten had a better diet than the older groups. All of the adolescent group were low in ascorbic acid or vitamin C. The girls were also low in iron and calcium.

> . . . the average number of servings of the various food groups for the children in either the rheumatic fever or non-rheumatic groups met or exceeded the basic 7 suggestions except for green and yellow vegetables and for citrus fruits and tomatoes.

When their diets were evaluated in terms of common foods the average number of servings of the various groups for adolescent girls were found to be low in their intake of milk. The use of sweets was too high. The authors state that if the use of sweets had been reduced and the use of vegetables, citrus fruits, tomatoes, milk, and eggs increased, low intakes of calcium, iron, thiamine, and ascorbic acid, of the older girls of both groups would have been corrected. They found that green and yellow vegetables, and ascorbic acid rich fruits or vegetables were not used with any regularity by many of the children.

Breakfasts were found to be grossly inadequate for many students in a study made by Stegelmeier (25) which included 705 students of senior high school and college age. More boys were eating a good

breakfast than girls. Over half of the high school girls were eating poor breakfasts. On the average, more girls of all ages ate breakfasts of poor rating. In all groups studied, citrus fruit was the most frequently missed food from the inadequate breakfast. She found that as an over-all picture, there seemed to be a tendency toward a steady increase in the total percentage of boys and girls consuming poor breakfasts with advancing age up to 20 years old.

Leverton (13) points out that the period of adolescence is one of rapid growth and development. For some it is a period of emotional extremes, relative instability, and turmoil. All these factors have their effect on the intake, absorption, and utilization of the food they need. Nutrition is one of the most important considerations of this period. The boys require more food than at any other age.

Many girls fail to eat correctly because of fear of overweight. One study showed that in overweight among these young people inactivity was more important than overeating.

Influence of Nutrition Education on Food Habits

"Building awareness of better living through better food is a long and important job. Turning awareness into daily application is still more difficult." (20)

Leverton (12) states that habit is a powerful force in determining what food becomes us. We eat according to our established food habits which are based on previous experiences and examples. Like all habits they can be good or bad. She believes that poor food habits can be corrected. Reasons why people do not eat wisely, as stated by Leverton (12), are:

1. Low standards--thinking of health as a mere absence of disease.

2. Ignorance--not knowing the importance of good nutrition and its effect upon our lives.

3. Inertia--poor nutrition gives us inertia which in turn robs us of the determination to make a change.

Other factors are: poor management; inability to plan, market, and prepare properly the food we need; as well as, poverty, poor food habits, resistance to change, delay between effect and cause in eating.

An over-all program of nutrition must do more than teach the individual good eating habits according to Eppright (4). It should develop a public consciousness of the importance of good nutrition and sound food policies for the promotion of our national vigor and stability. To meet these objectives, nutrition education is changing from a passive to an interesting subject, from subject-centered to person-centered or even society-centered.

Nutrition educators should make use of the five principles of learning.

1. Place emphasis on the individual background, goals, etc.

2. Consider learners own perception of the task to be accomplished and his readiness to learn the lesson to be taught.

3. Recognize importance of human relationships in the learning situation, that is, that people need to learn in an atmosphere that is friendly and relaxed and secure.

4. Involve the learner.

5. Make wise use of the many resources and materials now available.

People need to see the advantage of changing their food habits. Steps necessary to accomplish this objective are:

1. Convince people a problem exists.

A. Survey--well done and well analyzed.

B. Education.

a. Food groups are better understood by people than food nutrients.

b. Need to know why some groups (of foods) are neglected.

2. Must understand the social and cultural and religious componants of group you work with.

3. Must not think our own set of beliefs only right ones.

Eppright (4) made an interesting analysis of how farm people accepted new ideas. The mental processes consisted of five stages:

1. Awareness - Individual merely knows about the idea.

2. Wants more information on how he can be helped and what the idea is and how it will help.

3. Evaluation - Can he do it? Will it better him?

4. Trial - Small scale experiment.

5. Adoption - Large scale continued use of the idea and satisfaction with it.

Nutrition education is of most importance since the strongest root of happiness is health (Pattison, et al., 19). Schools have accepted health education. Nutrition is one of the most important single environmental influences affecting our well being. So health education which neglects nutrition is fulfilling only part of its function. Nutrition requirements change with age. That is why nutrition education should continue through school.

One of the most important safeguards of health in adulthood is maintaining normal body size. Good habits of eating and exercise from early childhood will help.

Youngsters may be influenced to consume better diets if they are convinced it will result in greater strength and athletic ability for

the boys and clearer skin and better looks in general for the girls. Another fact that impresses a girl is that her nutritional background, in the child bearing years to come, will vitally affect her well being and that of her babies. The best plan is to serve a good variety of well prepared and attractive foods from the basic food groups and have them eaten in a happy relaxed atmosphere.

According to Pattison, et al., (19) the problem of improving food habits is complicated and imperfectly understood. Actually, food habits are constantly changing. However, deliberate attempts to change them often meet with strong resistance. Some changes have been made to improve the American diet of which the people have been little aware. An example is the enrichment of bread. Enrichment of the school lunch program has been accomplished with little responsibilities on the part of the individual.

In spite of the many hours of teaching nutrition in the schools, diets of many school children have fallen far short of recommendations of the National Research Council. We need to find out why. Is it because our methods are ineffective, or because we do not reach the parents who control what is served at home? As educators, we must find ways of convincing people that there is a solid relationship between good health and good nutrition.

It must be remembered that there are many ways to obtain a good diet. Cultural and religious food patterns must be considered. The only sound criteria for judging the desirability of a food pattern is its effect upon the health or the resources of the family. Personal preference is an unsound basis for encouraging a change in food habits. A teacher of nutrition is most apt to improve the diets in a community

if she knows not only what modifications are desirable but also which are acceptable and possible.

When parents no longer closely supervise the diets of their children, there is special need for nutrition education at school.

Recognizing the goals of the different age groups will help the teacher to motivate the students to eat a good diet. Health for health's sake may be rather dull unless the teacher points out its relationship to other important values. Attractive appearance, a peppy personality, and ability to enjoy sports will all help to attract friends.

Not having tasted a food seems to be responsible for a failure to eat it at least as often as actual dislike for it. Miller (16) in a study of the acceptance of three vegetables by 28 Ohio fourth grade children found that school lunch should be recognized as an integral part of the total educational problem. A 1953 survey of dietary habits of children in the Newton Township School, near Newark, Ohio, indicated a need for the increased consumption of green and yellow vegetables to help meet the N. R. C. daily recommended allowances.

Acceptance of vegetables by fourth grade pupils was selected for this study. The children checked a list of 15 vegetables as to ones they liked, disliked, and never tasted. Broccoli, rutabaga, and squash were chosen for the study as the most unfamiliar vegetables. Reactions of the students were observed and recorded at sampling parties and noon lunch. Small quantities were served at a series of nine tasting parties. Reactions of individuals were self recorded. Then vegetables were served three times as part of school lunch. Acceptance here was observed.

In a final check list the number liking broccoli increased from 5 to 28 percent, rutabaga from 5 to 27 percent, and squash from 8 to 14 percent. The increased acceptance is an indication that children can be encouraged to eat specific vegetables.

Analysis of the observations in this study indicates:

1. Familiarity was a factor in the pupils acceptance.

2. Children do not always give the same response to specific vegetables on different occasions.

3. Apparently the broccoli, rutabaga, and squash acceptance by the parents of the pupils was not a determining factor in their reactions during this study.

Miller (16) recommended that interest may be increased by:

1. Participation in menu planning.

2. An active part may be played by the pupils in preparing the food they will eat.

3. Use of illustrative material such as posters, films, charts, may arouse interest.

4. Cooperation with other teachers, parents, and lunch personnel may help with the success of the projects.

5. Classroom activities: it may be possible to incorporate projects into classroom work units.

6. Collection of reliable data is dependent upon consistency of food preparation.

One of the objectives of nutrition education is to encourage, modify, or eliminate attitudes which govern the relationship between an individual and the food he eats, as well as his willingness to accept and apply nutritional information.

For a change of habits, psychological changes must take place in the person. Food choices are bound up with emotional attitudes unconsciously acquired but grimly held. Those who assume that food is eaten primarily for health, live apart from mankind. Those who believe food habits are easily changed are not aware of the roots of the dislikes.

The proceedings of the Nutrition Education Conference (3) concluded that it is of vital importance that nutrition facts should be

presented in such a way that people will be stimulated to make use of them to improve their food habits. Further observations from this report were that:

Families in higher income brackets tend to have diets which more nearly meet the N. R. C. recommended allowances, but even among these families nutrition education is needed.

When people have more money they tend to buy meat so that during periods of high income, protein intake would not need to be emphasized. The study shows that even under the most favorable economic conditions, good sources of calcium and ascorbic acid would still need to be emphasized.

The National Dairy Council and the Key Clubs in one high school in Florida and one in Utah cooperated on a project to determine if students would gain better food habits by nutrition education (2). The conclusion drawn from the experiments was that teen-agers under proper leader guidance do recognize the benefits available to them through participation in nutrition projects. "Teen-age nutrition projects undertaken by organized youth groups provide another means of stimulating the teen-agers interest in a better understanding of the importance of nutrition."

A study to determine the affects of education on food intake was done by Manuel (15) on students of the first, fourth, and seventh grades in two parochial schools in Texas. One hundred six children were studied. Before instruction 26 percent had good meals, 25 percent had fair meals, and 47 percent had poor meals. After instruction, 29 percent of the meals were rated good, 36 percent rated fair, and 33 percent rated poor.

Some of the conclusions found in their study were as follows:

1. A distinct improvement in the meals reported by children following instruction.

2. The girls showed greater improvement than boys and the meals at the end of the study were approximately equal in quality for both sexes.

3. An increase in consumption of green and yellow vegetables and citrus foods and butter, with a decrease in meat, eggs, and cereals.

4. Absenteeism was definitely related to meal quality.

Whitehead (28) says young people need help in getting a good diet for often they are unaware they have a problem, they hesitate to admit they have a problem, and they need guidance to solve their problems.

O'Brien (17) believes that the "Nutrition Fair" has a beneficial effect in improving diets. This feature was part of an education campaign in Chicago's Kosciuszhs Elementary School. In this study, posters, spelling of food terms, teaching nutrition units in all classes, and having a school fair to which parents were invited, were all used in an effort to improve nutrition in the school. The project resulted in a 6 percent improvement in those eating a good breakfast, a 3 percent decrease in those eating no breakfast, and a 3 percent decrease in those eating a poor breakfast.

Jacobson (8) made a study of helping children learn nutrition. He states that there are probably fewer cases of extreme malnutrition now than in the past. However, there are many people who are handicapped by being overweight or underweight, and perhaps even more who do not have the energy and drive that they should have because of an inadequate diet.

He feels that progress in nutrition education is slow. Reports of extensive diet surveys indicate that family eating patterns have

not improved as much as nutritionists would like during the last decade. There are probably many reasons for this. Perhaps the effectiveness of many nutrition programs is countered by the many powerful forces in our society that attract people to unhealthy eating practices. Our habitual behavior patterns are usually formed early and often change very little throughout the rest of our lives.

Other studies support the thesis that habits learned by youngsters tend to persist throughout life. Perhaps more attention should be given to the nutrition habits that our children develop in their early years.

Leverton (13) believes we should avoid the negative approach in presenting the facts on nutrition, rather than emphasize the predicament of "Our Starving Teen-agers," we should publicize the fact that there are many well nourished teen-agers with good food habits. The adolescent's problems and desires should be recognized, the strengths also emphasized to try to bring about improvement.

METHOD OF PROCEDURE

This study was conducted in February, March, and April 1958 at North Cache High School, Richmond, Utah, with the aid of 48 girls of the home living classes who worked under the direction of their teacher.

Authorization for the Study

Approval to carry out the project was obtained from the directors of the state and county school lunch programs, from the county superintendent of schools, from the faculty of the high school, and from the high school lunch personnel. The proposed study was presented to the girls of the home living classes at the high school and their cooperation gained.

Subjects

The subjects of the study were students of the school. Two hundred twelve boys and 195 girls participated in the dietary study. An additional 35 students filled in the questionnaire at the beginning of the study. The students ranged in age from 15 to 18 years.

Methods of Collecting Data

A survey and questionnaire (Appendix sheet 1) was constructed. The survey sheet consisted of six pages. The first page was a questionnaire asking for information on vital statistics and food habits and attitudes. The second page was a list of foods to be checked for

likes and dislikes and for favorite vegetables. The next three pages provided space to record the food intake for the three day period. The last page gave instructions on measuring food intake and keeping the food record. For this purpose a modification of a form developed at Utah State University and used by Leora Galloway in 1954 was used. The questionnaire was given a trial run in the home living classes. Some changes were made in the interest of clarity.

Early in February, copies of the survey were taken to the 17 home rooms at the school by the students of the home living classes. The girls had prepared a talk with which to introduce the study and try to gain the students' cooperation in filling in the questionnaire and dietary sheets. The first page of the questionnaire was filled at this time. Then the students were instructed how to keep a three day dietary record on the sheets provided for the purpose. The girls offered to serve cookies to the students of the home rooms who achieved a 100 percent return on survey sheets. On the fourth day the students of the home living classes went back to the various home rooms where they collected the surveys.

Six home rooms achieved a 100 percent return. A total of 442 questionnaire sheets and 407 dietaries were handed in by the students, a few more came in but had to be discarded because they were incomplete. Of the questionnaires, 239 were from boys and 203 were from girls; of the dietaries, 212 were from boys and 195 were from girls. The home living classes spent the next few days tabulating and analyzing the results.

It soom became apparent that the students of North Cache High School had some real problems in nutrition. Many were eating an inadequate breakfast or none at all. As for the whole day, they were

not eating enough green and yellow vegetables to give them the required amounts of vitamin A, nor were they getting enough ascorbic acid or vitamin C-rich foods. Other deficiencies were also evident but those listed above were most general, so they were chosen to be emphasized in an educational campaign.

In an effort to improve the food habits of the students by giving them information and instruction, many activities were employed in the next seven weeks. The home living classes were organized into committees to carry out different phases of the program.

One committee worked with the school lunch. The school lunch personnel cooperated willingly. Before the educational campaign got started, six vitamin A- and C-rich foods were served without comment. These foods were: broccoli, liver, tomatoes, green peppers, red and green cabbage, and baked potatoes. These foods were weighed, measured, or counted before being served, and the number of students eating recorded. The girls collected the waste then weighed, measured, or counted it. After a period of about two weeks had elapsed, each food was served again at intervals, but with a difference. Prior to the second time served, instruction was given by way of posters in the halls and lunch room, home room bulletins, clever slogans, charts depicting the value of the food in human nutrition, films, rat feeding projects, and exhibits. The waste was again checked and amount consumed compared with the first serving.

Another committee prepared a home room bulletin presenting the deficiencies in the eating habits of the students and giving information on functions of various foods in the body, results of inadequate intake, and information on foods which contained the desired nutrients. The girls supplemented their talks with posters, skits, and food

models. They also gave each student a comic book to read, "Eat Right to Win."

Another group prepared a radio skit which was presented to the whole school over the intercom system.

to here Page 2a Still another group carried on a rat feeding experiment. Five rats, each in separate cages, were used for the experiment. One rat was given an inadequate diet, such as was found to be in use by some students at North Cache, of hamburger, potatoes, oatmeal, navy beans, bread, butter, apple pie, and water. One was given the inadequate diet plus milk. Another was given a snack diet of soda pop, doughnuts, bread, butter, jam, candy, cheese, and peanut butter sandwiches. Two others were fed an adequate diet consisting of the inadequate diet plus milk, eggs, vegetables, and fruit. The rats were weighed weekly and their growth, appearance, and behavior noted. After seven weeks they were disected and internal differences checked. These rats with their growth chart were exhibited in the main hall to the students once a week.

Start Still another group of girls displayed a calcium exhibit showing the amount by weight of dicalcium phosphate contained in the human body at various ages. This group also obtained Walt Disney's film, "Something You Didn't Eat." It was shown in the auditorium at noon on two different days and to the students of five home rooms. The film, "The King Who Came to Breakfast" was shown to five home room groups.

to here At the close of this campaign which lasted about seven weeks, an opinion poll and a two day food dietary was taken of 156 students. In the second survey the opinion poll (Appendix sheet 2) and the two day dietary were completed by 55 boys and 101 girls.

The 156 students who were selected for the opinion poll and second dietary were those who had signed their names to the first survey. These dietaries were matched with those recorded by the same students in the first survey and from these a comparison was made to see if any improvement in food habits had occurred.

Calculation of Data

The questionnaires, opinion polls, and dietaries were divided into six groups for calculation as follows:

Group 1: Boys of the matched group of the first survey.

Group 2: Girls of the matched group, first survey.

Group 3: Boys of the unmatched group, first survey.

Group 4: Girls of the unmatched group, first survey.

Group 5: Boys of the matched group, second survey.

Group 6: Girls of the matched group, second survey.

The data for these groups were analyzed separately and in combinations to obtain results. Food likes and dislikes for 22 vegetables and liver were recorded and compared. Breakfast intake and total intake for the day were tabulated for milk, eggs, meats, cheese, legumes, potatoes, green and yellow vegetables, high-vitamin C foods, other fruits, cereals, bread, and butter or margarine.

In order to rate the quality of the breakfasts some standards had to be adopted. After study of several rating devices the one used by Stegelmeier in 1957 was used. Some slight modifications were made. The score that was used is shown in Table 1.

In order to rate "good" a breakfast must score 5.6 or above and include a serving of both milk and a high-vitamin C food. In order to rate "fair" it must score 3.6 or above and include a serving of either

Table 1. Numerical values assigned to breakfast foods

Food	Measure	Score	Maximum allowed
Milk	1 cup	2.0	4.0
Eggs	1	1.0	2.0
Meat	1 serving	1.0	1.0
High-vitamin C food	½ cup	2.0	3.0
Non-citrus fruit	½ cup	1.0	1.5
Bread	1 slice	0.5)	3.0
Cereal	½ cup	1.0)	
Butter	1 serving	0.5	0.5
Sugar	1 serving	0.5	0.5
High energy foods	100 cal. portions	0.5	0.5

milk or a high-vitamin C food. Those breakfasts scoring below 3.6 were rated as poor.

Ratings were made for the total day as well as for breakfast. It was decided to use the method of Pattison, et al., (19) to score the food intake for the total day (Appendix sheet 3).

At the end of the study, each girl in the home living classes was asked to write a report of the part she had carried out and to evaluate it from a personal point of view.

The study was carried to the public through newspaper articles and presentations to groups. Two girls of the home living classes presented the tentative findings to a group of students at the

Lewiston Elementary School. Two other girls and the teacher presented the findings as they pertained to the school lunch to a group of school lunch supervisors at U. E. A. meetings in October 1958.

RESULTS AND DISCUSSION

Breakfast

Findings from the questionnaire indicated that 296 students out of 442, or 66.7 percent, were eating breakfast regularly (Figure 1 and Appendix Table 1). Of these 192 were boys and 104 girls. Another group of 102, 23 percent, ate breakfast sometimes. Of these 32 were boys and 70 were girls. In the group of 7 percent who seldom ate breakfast, 6 were boys and 25 girls. The 8 students who never ate breakfast were divided equally between boys and girls.

The students who did not eat breakfast regularly were asked to give reasons for not eating. Various reasons were given (Table 2). Eighty-nine said that they did not have enough time. Of these 64 were girls and 25 boys. One boy and 5 girls feared overweight. Four boys were too tired in the morning to eat. Fifty-nine students, 44 girls and 15 boys, said they were not hungry in the morning. Fourteen, 2 boys and 12 girls, said that no breakfast was prepared for them. Three boys and 21 girls disliked breakfast foods, hence they did not eat breakfast. The reasons most often given for not eating breakfast regularly were "too little time" and "not hungry in the morning." This was true for both boys and girls.

When an opinion poll and the second survey were taken seven weeks later after the close of the education campaign, 156 students, 55 boys and 101 girls, participated. The results of the opinion poll were as follows: (a) A total of 83 students (23 boys and 60 girls), or 53

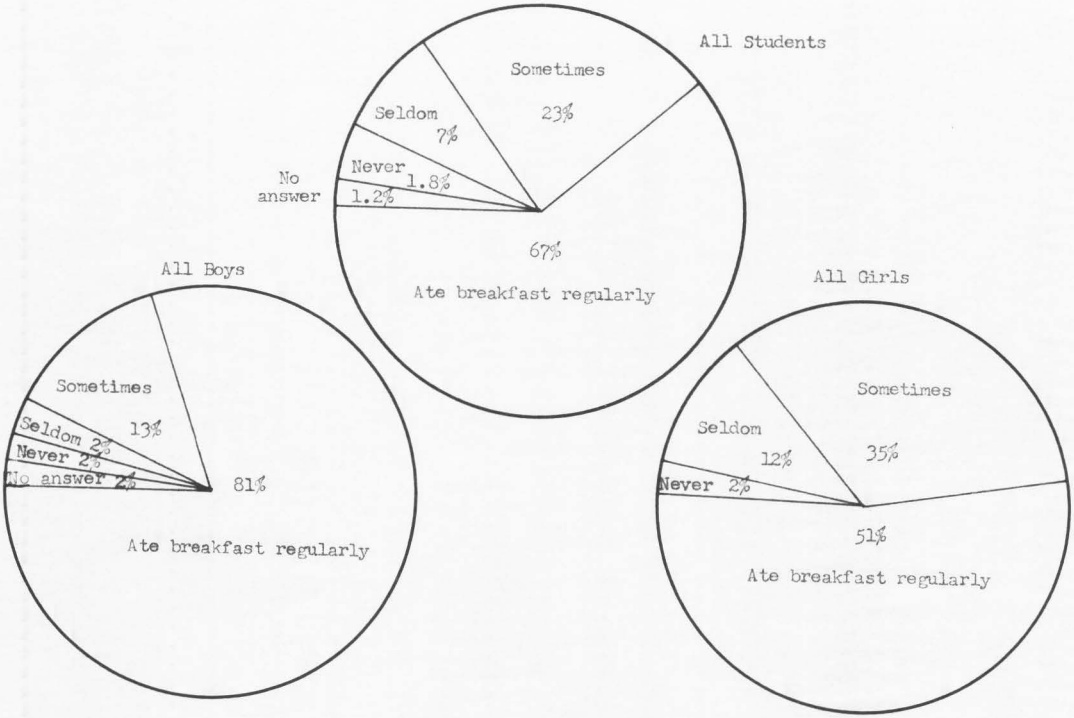

Figure 1. Breakfast habits of 442 students

Table 2. Reasons given by students for not eating breakfast regularly

Reasons	47 boys		99 girls		All students	
	Number	Percent	Number	Percent	Number	Percent
Too little time	25	33	64	65	89	61
Fear of everweight	1	2	5	5	6	4
Too tired to eat	4	9	0	0	4	3
Not hungry	15	32	44	44	59	40
No breakfast prepared	2	3	12	12	14	10
Dislike breakfast food	3	6	21	21	24	16

percent, said they had eaten a better breakfast as the result of the educational campaign conducted by the home living classes. (b) Seventy-one students, or 45 percent (30 boys and 41 girls), said they had not eaten a better breakfast

A total of 407 students took part in the first dietary survey and 156 in the second dietary survey. In the first survey a three day diet record was kept, in the second a two day dietary was recorded. A detailed study of the breakfasts of each student for the two survey periods was made.

In checking the actual food intake for breakfast from the second dietary survey, it became evident that in reality the breakfasts eaten by the students did not show as much improvement as the students thought they had made in the opinion poll.

Matched groups

All students. The matched groups consisted of 156 students. Of these 55 were boys and 101 girls. When all students of the matched group were considered 19 students or 12 percent ate a good breakfast in the first survey, while 23 students or 15 percent of those in the second survey ate a good breakfast (Figure 2 and Appendix Table 2). This increase was 2.5 percent. The number eating a fair breakfast the first time was 79 or 51 percent, as compared to 87 or 56 percent in the second survey. Here the improvement was 5 percent. A poor breakfast was eaten by 53 students or 34 percent, and by 43 or 28 percent in the first and second surveys, respectively. This improvement was 6 percent. No breakfast was reported by 5 students the first time and by 3 students the second time. This was an improvement of 1.3 percent of the total number.

After the educational period slightly over half of all the students in the matched group were eating breakfasts that rated fair; almost one-third had poor breakfasts; and 15 percent were getting good breakfasts. These percentages represented from 2.5 to 6 percent improvement in breakfasts.

Boys. The percentage of boys eating good breakfasts increased from 18 to 22 percent after the educational campaign (Figure 3 and Appendix Table 2). This was a gain of 4 percent. For fair breakfasts, the percentage (64 percent) was the same in both surveys. The number of poor breakfasts decreased, 18 vs. 13 percent for the two surveys. Thus an improvement of 5 percent was shown in this group. Although every boy ate breakfast in the first survey, one boy did not eat breakfast in the second survey.

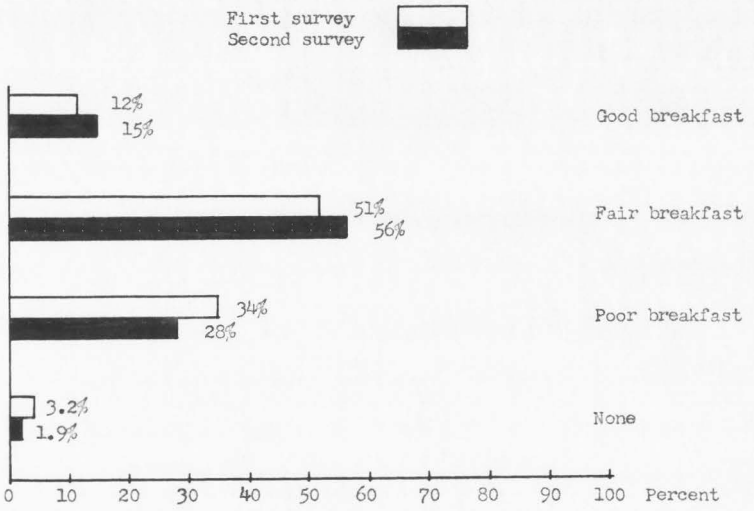

Figure 2. Quality of breakfasts of all students of matched groups

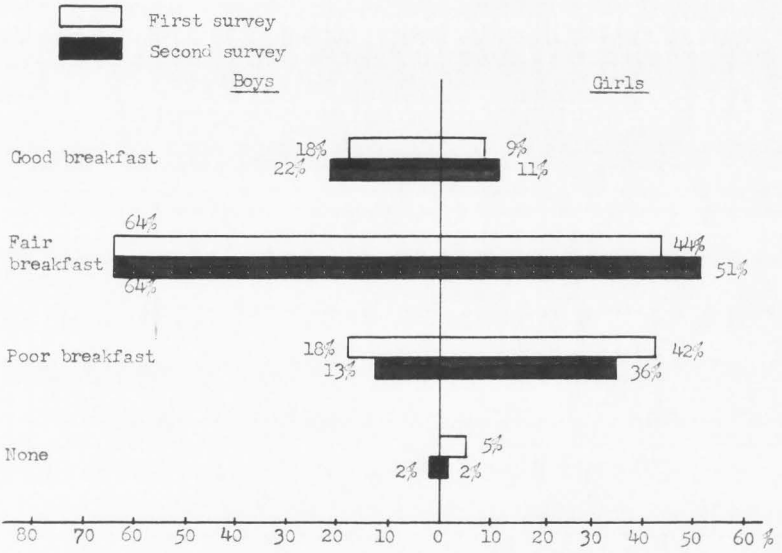

Figure 3. Quality of breakfasts of boys and girls of matched groups

Girls. The breakfast scores of the 101 girls in the matched survey showed improvement all along the line. These girls also made a better percentage of improvement than the boys did, however, the need for improvement was greater with the girls. Nine breakfasts or 9 percent scored good in the first survey while 11 or 11 percent scored good the second time showing a 2 percent gain (Figure 3 and Appendix Table 2). The first survey showed 44 breakfasts or 44 percent scored fair, in the second survey 52 breakfasts or 51 percent. This was an improvement of 7 percent. The number of breakfasts scoring poor in the first survey almost equalled those that scored fair, while in the second only 36 or 36 percent rated poor. This represented a decrease of 6 percent. The decrease in the number of girls having no breakfast was 3 or 3 percent. This was a decrease from 5 to 2 percent in the second survey.

Matched and unmatched groups

All students. When all of the students, matched and unmatched, were considered it was found that 17 percent ate a good breakfast, 51 a fair breakfast, 29 a poor breakfast, and 2 percent had no breakfast (Figure 4 and Appendix Table 3). These percentages are similar to those for all students in the matched groups in the first survey (12 percent good, 51 fair, 34 poor, and 3 no breakfast).

Boys. Two hundred twelve boys took part in the first survey. Of that number 53 or 25 percent ate a good breakfast. A fair breakfast was eaten by 128 or 60 percent and a poor breakfast by 31 or 15 percent. All boys ate breakfast in the first survey. In the first survey the total group of boys and the matched group rated almost the same. The breakfasts of the matched group of boys scored as follows: 18 percent good, 64 fair, 18 poor, and 0.

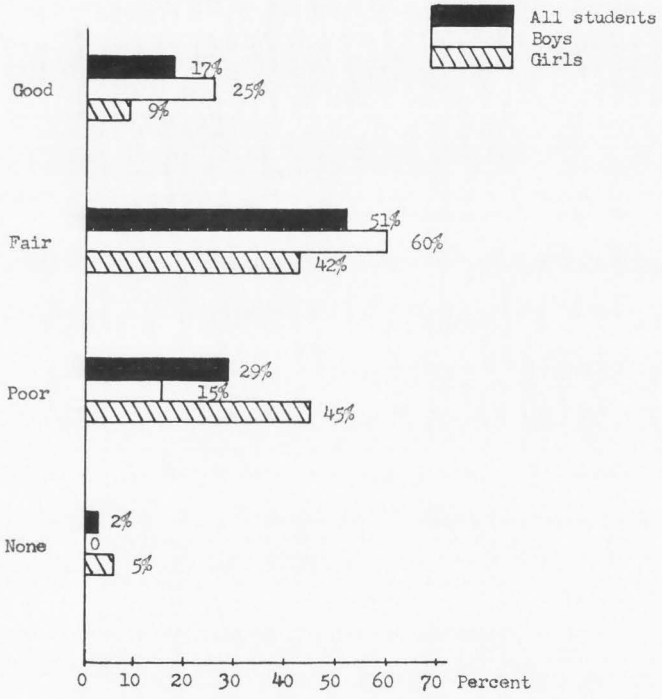

Figure 4. Breakfast ratings of 407 students in the first survey

Girls. Of the 195 girls in the first survey 17 or 9 percent had breakfasts that rated good, 81 or 42 percent breakfasts that rated fair, 88 or 45 percent breakfasts that rated poor, and 9 girls or 5 percent ate no breakfast.

The total group of girls and the matched groups made similar ratings in the first survey. The percentage scores for the breakfasts of the matched group of girls were as follows: good 9, fair 44, poor 42, and no breakfast 5.

In the study done by Stegelmeier (25) in 1954 breakfasts of 37 senior girls at North Cache High School were included. The percentage of the group in each rating was as follows: 2 good, 62 fair, 27 poor, and 8 none. This compared with the percentages found in this study of 9 rating good, 42 fair, 45 poor, and 5 none, which indicated that many of the girls' breakfasts were poor in both surveys.

Total Intake for the Day

Matched groups

All students. All students of the matched groups increased the percentage of the day's total diets rated as good from 17 to 31 percent in the first and second surveys, respectively, or a total of 14 percent. The increase in those rating fair was from 31 to 38 percent or a total increase of 8 percent. The intakes rating poor decreased from 52 to 31 percent or a total of 21 percent (Figures 5 and 6 and Appendix Table 4).

Boys. The boys of the matched groups made a gain of 15 percent in those having an intake rated good (27 compared to 42 percent in the first and second surveys). Daily intakes rated as fair increased by

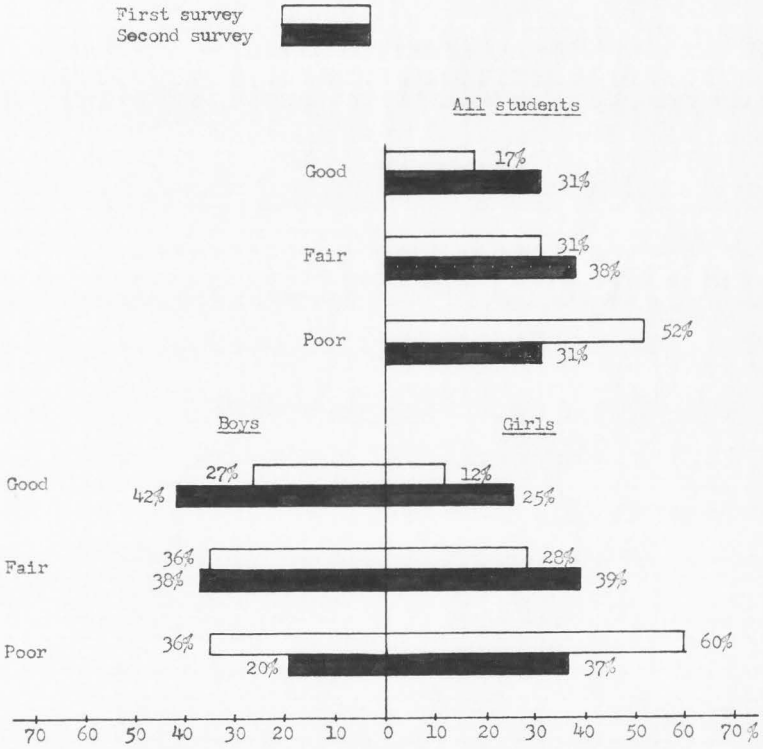

Figure 5. Rating of total food intake per day of matched groups

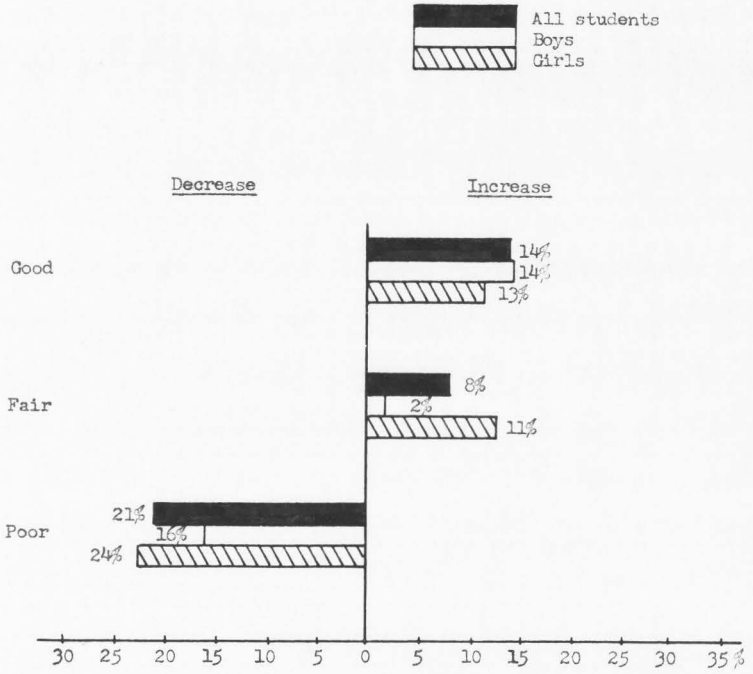

Figure 6. Percentage change in ratings of total daily food intake of matched groups

2 percent (36 vs. 38 percent). Intakes rated as poor decreased by 16 percent (36 vs. 20 percent).

Girls. The girls of the matched group increased the percentage of those having ratings of good by 13 percent (12 and 25 percent in the first and second surveys). There was an increase of 11 percent in fair ratings (28 vs. 39 percent). A decrease of 23 percent in those having a rating of poor was noted (from 60 to 37 percent).

Relation of breakfast rating to total day's dietary rating. The second dietary study showed that many students had improved their food intake. It was interesting to note, however, that of these students having a poor breakfast in the first survey, few of them made up the deficiency in the total day's diet. Eighty-four percent of those having a poor breakfast had a poor intake for the day. Fourteen percent had a fair intake, and only 2 percent had an intake that rated good (Table 3).

Table 3. Rating of the total day's diet for the students of the matched group who had a poor breakfast

Rating of total intake	First survey		Second survey	
	Number	Percent	Number	Percent
Good	1	2	1	2
Fair	8	14	18	39
Poor	49	84	27	59
Total	58	100	46	100

In the second survey, more students had at least partly made up for the poor breakfast in the whole day's intake. This time 59 percent had a rating of poor for the day, while 39 percent had a fair rating, and 2 percent a rating of good (Table 3).

The evidence is that the educational campaign had made many of the students more food conscious so that if they ate a poor breakfast in the morning, a larger number made up the deficiency during the day than did in the first survey.

Matched and unmatched groups

All students. When the larger group of students including both matched and unmatched groups in the first survey was considered, the percent having ratings of good, fair, and poor for the food intake for the entire day was 22, 34, and 44 percent (Figure 7 and Appendix Table 5). These figures compare with the 31, 38, and 31 percent of the matched group of students whose daily diet rated good, fair, and poor in the second survey (Figure 5 and Appendix Table 4).

Boys. The percent of all boys in the first survey having ratings of good, fair, and poor was 29, 40, and 31 percent (Figure 7 and Appendix Table 5). This compares to 42, 38, and 20 percent for the boys in the matched group in the second survey (Figure 5 and Appendix Table 4).

Girls. Percentages of all girls having good, fair, and poor breakfasts were 14, 27, and 59 percent in the first survey (Figure 7 and Appendix Table 5). This compares to 25, 39, and 37 percent for the girls in the matched groups in the second survey (Figure 5 and Appendix Table 4).

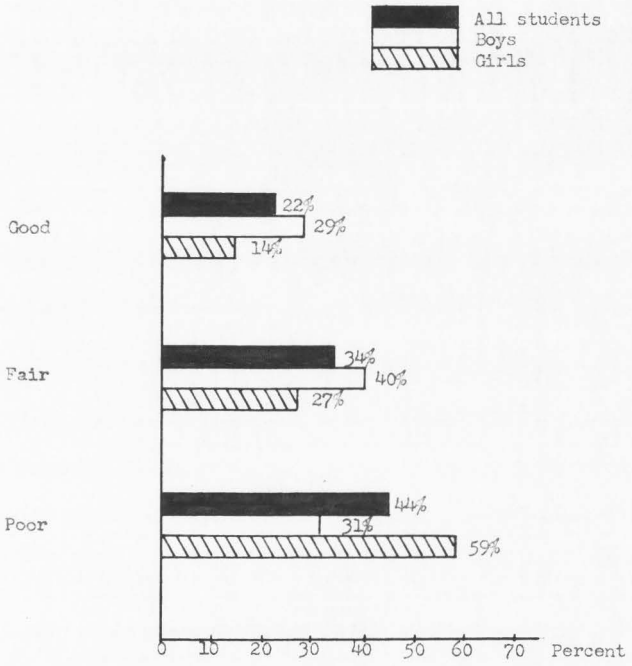

Figure 7. Rating of total food intake per day for all students (407)

High-Vitamin C Foods and Green and Yellow Vegetables

First survey

The first dietary survey revealed that only 24 percent of all students were getting one or more servings of high-vitamin C foods per day. This was true for both boys and girls. Thirty-eight percent of all students were not getting any vitamin C-rich foods. Thirty-seven percent were receiving between 0.4 and 0.9 servings per day (Figure 8 and Appendix Table 6). The average per student per day was 0.46 serving. Since vitamin C is not stored in appreciable amounts in the body and should be included in each day's diet, it is evident that many of the students were not receiving even a minimum amount.

Again the first survey showed that many students (32 percent) were not getting any leafy green and yellow vegetables, others were not getting nearly enough to meet the minimum requirements, and only about one-third were eating an average of one or more servings per day (Figure 8 and Appendix Table 6).

Because of the deficiencies in intakes of vitamin C-rich food and in green and yellow vegetables, these two food groups were chosen along with breakfast to be emphasized in the educational campaign. The home living classes made colorful posters which informed the students of the need for these foods and displayed them in the halls and home living department. The girls went in teams of two to the 17 home rooms where they displayed food models of an adequate diet, gave talks to explain the body's need for these foods, and passed out a comic book ("Eat to Win") and asked the students to read it.

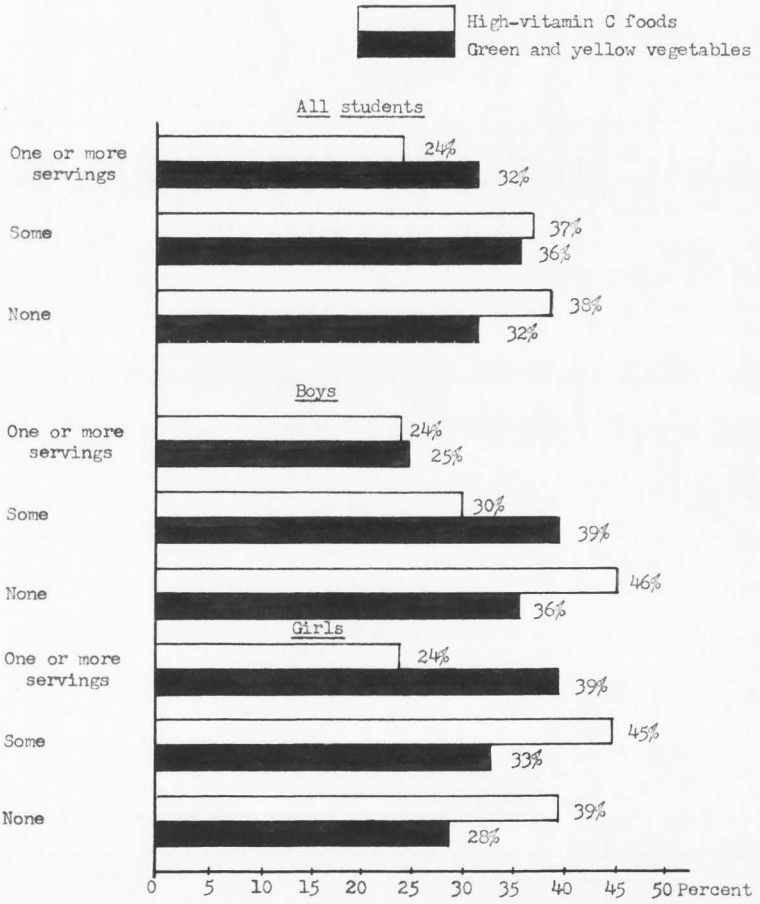

Figure 8. Daily intake of high-vitamin C foods and green and yellow vegetables as shown in first survey (407 students)

School lunch study

The girls also carried on a foods study in cooperation with the school lunch personnel. High-vitamin C foods and green and yellow vegetables were served the students before the beginning of the educational campaign. Amounts served were weighed or measured, and waste checked. The foods served were: baked potatoes, broccoli, liver, green peppers, tomatoes, and green and red cabbage. The girls then put on an informative program for each food, after which it was served again in the school lunch. Again they would carefully weigh or measure amounts served and check waste. The potatoes were not checked as these were done for a trial run. The second time the foods were served there was an increase in the average amounts consumed by the students of liver, green peppers, tomatoes, and red and green cabbage. There was a slight decrease in the amount of broccoli consumed. This might have been due to the fact that the broccoli served the second time was not quite as good quality as that served the first time.

The following table shows the results of the school lunch project.

Table 4. Results of school lunch study, amounts of food eaten per student

	Green peppers	Red and white cabbage	Tomatoes	Liver	Broccoli
Before education campaign	.085 oz.	.378 cups	.607 servings	.964 servings	.771 oz.
After education campaign	.117 oz.	.465 cups	.703 servings	1.08 servings	.734 oz.
Third time served		.494 cups			

Second survey

In an opinion poll of the matched groups the students were asked if they had eaten more of these foods as a result of the educational campaign. Ninety students or 58 percent answered yes, and 63 or 40 percent answered no for high-vitamin C foods. For the remaining 2 percent there was no answer. Seventy-one students or 45 percent answered yes and 79 or 50 percent answered no for green and yellow vegetables. Five percent gave no reply.

For the matched groups there was an 11 percent increase in those having one or more servings of high-vitamin C food. There were also more students, both girls and boys, who had no high-vitamin C food (Figure 9 and Appendix Table 7).

From the second dietary of all students in the matched group it was evident that some improvement (9 percent) had taken place in the number who were having one or more servings of high-vitamin C food per day. Fewer students were having some (0.9 to 0.1 serving) vitamin C foods per day. An increased percentage (6 percent) had no vitamin C-rich food at all for the two days of the survey. Trends for more students to have an intake of one or more servings per day and also for more students to have no vitamin C-rich foods were true for both boys and girls.

A study of the intake of green and yellow vegetables for the matched groups showed a great deal of improvement had taken place. After the educational campaign 43 percent more students of the matched group had an adequate intake of green and yellow vegetables. Thirty-five percent more students had some. The girls made a 41 percent gain in 0.5 or more servings per day, the boys 45 percent improvement. Eight percent of the students who had none in the first survey had

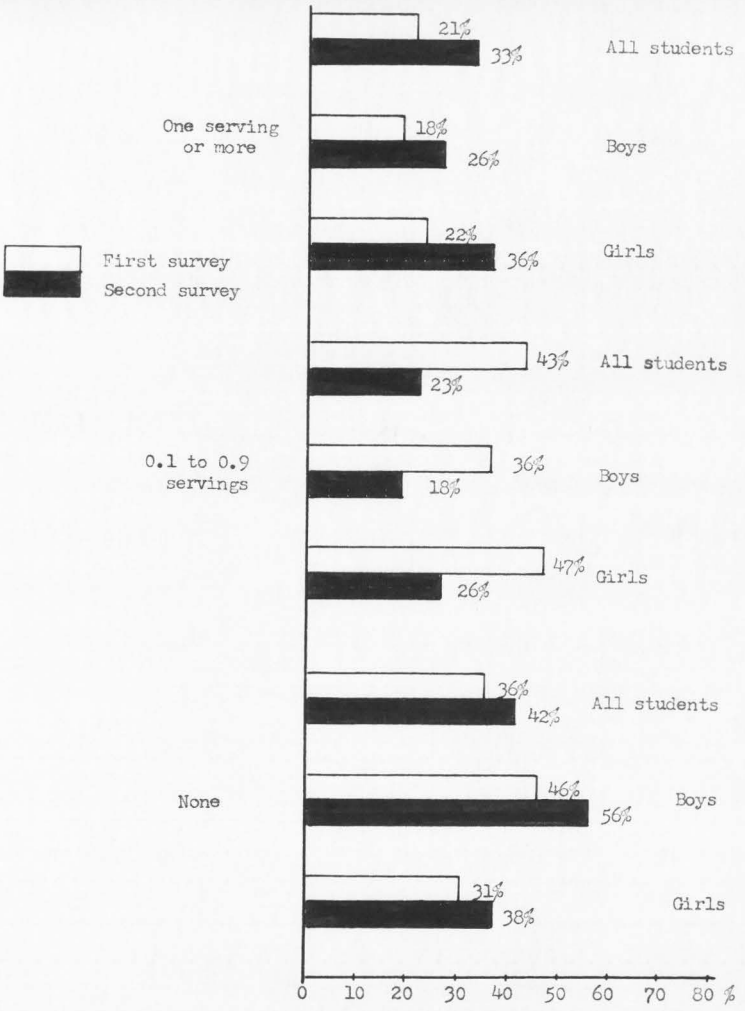

Figure 9. Daily intake of high-vitamin C foods for students of the matched groups

some of these foods in the second survey. Ten percent of the boys were taken off the "none" list, and 5 percent of the girls (Figure 10 and Appendix Table 8).

In the first survey the average amount of high-vitamin C food consumed per student was 0.46 serving, in the second survey it was 0.478 serving (Table 5). This, however, does not disclose the true picture

Table 5. Average amounts of vitamin C-rich foods and green and yellow vegetables consumed per student per day

	Matched group		All students	
	Green and yellow vegetables	Vitamin C-rich foods	Green and yellow vegetables	Vitamin C-rich foods
		All students		
1st survey	.342	.425	.366	.46
2nd survey	.66	.478	---	--
Percent of change	93%	12.4%	---	--
		Boys		
1st survey	.306	.38	.333	.42
2nd survey	.60	.40	---	--
Percent of change	96%	5%	---	--
		Girls		
1st survey	.38	.47	.40	.50
2nd survey	.73	.556	--	--
Percent of change	90%	18%	--	--

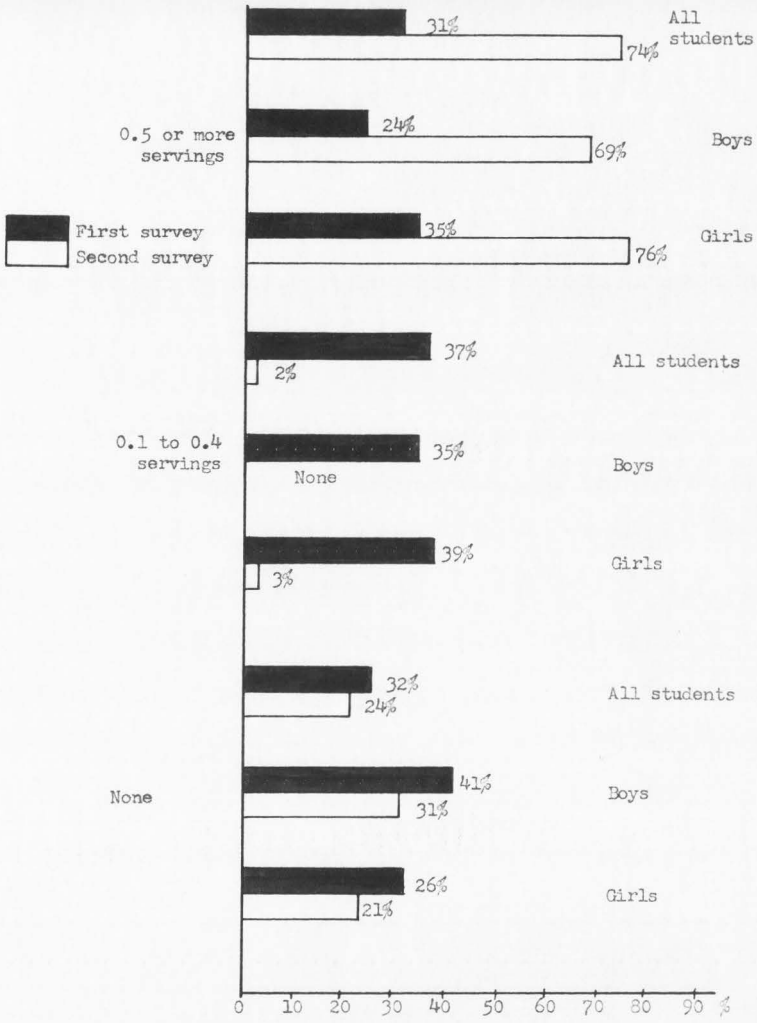

Figure 10. Daily intake of green and yellow vegetables for students of the matched groups

as there were many students (36 percent in the first survey and 44 percent in the second survey) who received no high-vitamin C food at all.

For green and yellow vegetables the improvement in average amount consumed per student was much greater. The average amount consumed changed from 0.36 serving per student to 0.66 serving, an improvement of 82 percent (Table 5).

Food likes and dislikes

In the first survey students were asked to check 22 vegetables and liver for acquaintance with each food and for likes and dislikes concerning it. The results of this check turned out as follows: corn was the most popular vegetable, 80 percent of the students liked it; lettuce came second with 73 percent liking it; carrots came third with 70 percent expressing a liking for them. Sweet potatoes, peas, and celery were next in order. Thirty-one percent of the students disliked parsnips, 30 percent green lima beans, and 28 percent green peppers. Thirty-six percent of the students had never tasted Brussels sprouts, 32 percent had not eaten broccoli, and 18 percent had never tasted beet greens (Figure 11 and Appendix Table 9).

Liver was liked by 36 percent of the students, disliked by 29 percent, and only one percent had never tasted it.

The fact that broccoli, Brussels sprouts, green peppers, and other high-vitamin C vegetables were not favorites with the students may help to explain the low intake of vitamin C among the students. Although carrots rated third high as a favorite vegetable, there were not enough of them and liver, with the other green and yellow vegetables, eaten during the second dietary survey to provide sufficient intake of these foods for most of the students.

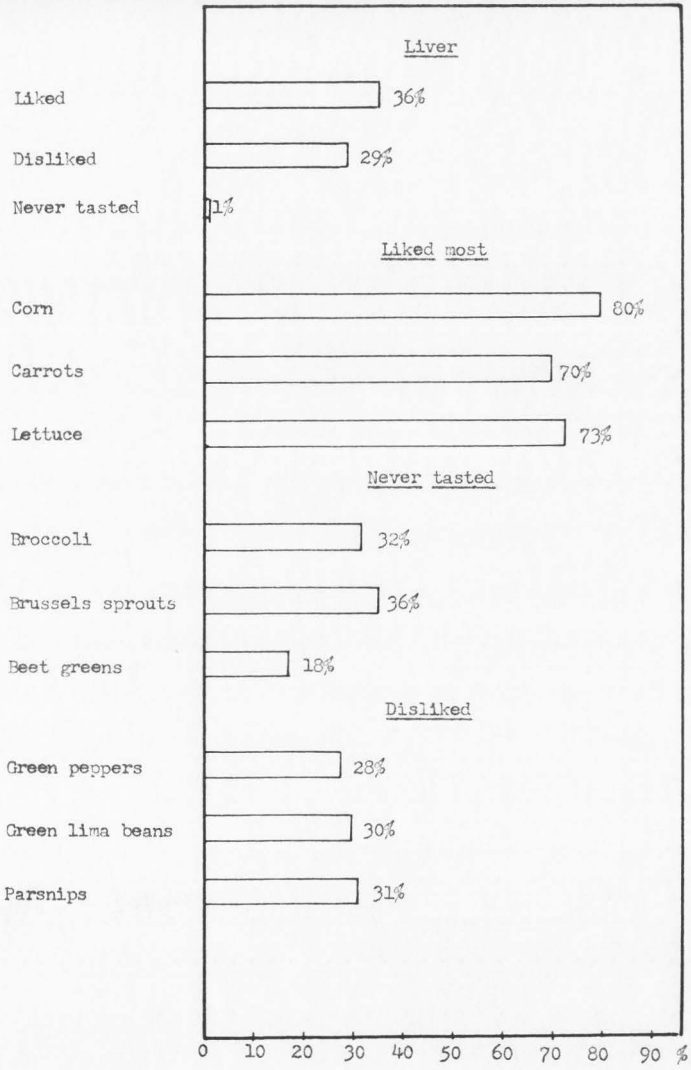

Figure 11. Students' likes and dislikes for some vegetables and liver

Other Features of the Educational Campaign

As part of the educational campaign a number of features were carried on which applied to nutrition in general and were not limited to breakfasts, high-vitamin C foods, or green and yellow vegetables which had been chosen for emphasis. They are as follows:

1. In order to emphasize the value of milk in human nutrition, an exhibit of amounts of dicalcium phosphate present in people of four different ages from infancy to adulthood was placed in the main hallway of the high school. Charts and placards were also shown which depicted the foods from which the body gets its calcium and amounts to be eaten in order to insure an adequate supply.

2. "Something You Didn't Eat" and "The King Who Came to Breakfast" were the two films that were shown to five classes and also shown in the auditorium at noon to anyone interested. Thirty-five students said they received helpful information from seeing them. Thirty-seven said the films had made them more food conscious, and three students said that they tried some of the ideas at home (Table 6).

3. A rat feeding experiment was carried on for seven weeks by a group of girls from the home living classes. This project attracted attention throughout the school. Five rats were kept in separate cages and fed on different diets. The rats were weighed, marked by clipping their ears, and named after members of the "Mighty Mouse" group.

a. One rat, "Jerry," was fed a snack diet of candy, pop, jam, doughnuts, and occasionally a cheese sandwich. This rat didn't grow well, his fur became rough, his eyes dull, and he became very irritable and hostile. Soon he had to be handled with gloves. If

Table 6. Opinion poll of effects of educational campaign, second survey, matched group

	Didn't notice		Gave helpful information		Made more food conscious		Tried ideas	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Posters	26	17	45	29	61	39	24	15
Films	71	45	35	22	37	23	3	2
Radio skit	69	44	47	30	20	13	1	1
Rat feeding	40	25	68	43	58	37	4	2
Home room bulletin	50	32	39	25	32	20	9	6
Comic book	39	25	29	18	14	9	0	0

anyone happened to put a hand on his cage he would bite it. The girls described him as ugly to look at.

b. Another rat, "Terry," was fed an inadequate diet which did not contain milk. It consisted of hamburger, potatoes, oatmeal, navy beans, bread, butter, and apple pie. This rat grew larger than the "Snack" rat but not so large as those on a good diet (Figure 12). He changed from a friendly, good looking rat to a nervous hostile rat with a rough coat.

c. The third rat, "Tom," was fed the inadequate diet plus milk. He became one of the largest rats. He was lively and easily handled.

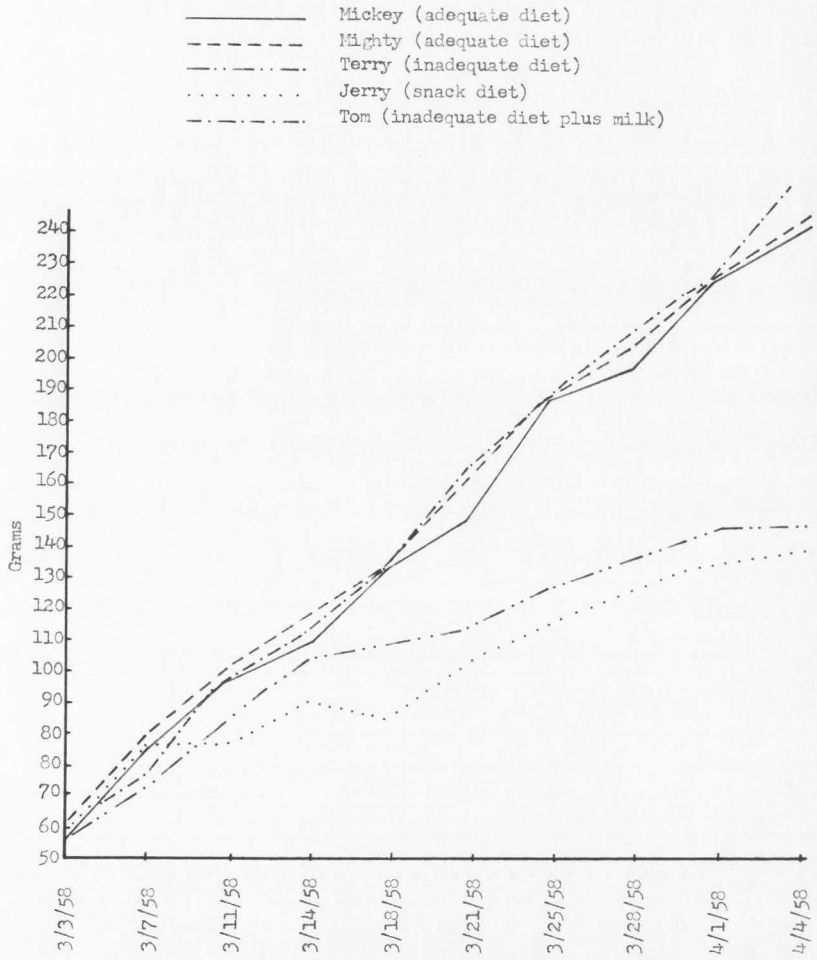

Figure 12. Gain in weight of rats on adequate and inadequate diets

d. The other two rats, "Mickey" and "Mighty," were given the inadequate diet plus milk, eggs, vegetables, and fruit. These two rats grew similarly to "Tom." They had smooth glossy coats, bright eyes, and good dispositions. The girls described them as active, friendly, and with pretty shiny coats.

The number of rats, five, used for the project and the seven weeks time involved were both insufficient to show differences in "Tom" who had milk added to the diet, and the two rats, "Mickey" and "Mighty," on the same diet plus vegetables, fruit, and eggs. With a larger number of rats, or a longer time of feeding them the differences would probably have been more marked.

The rats were put on display once a week in the main hallway. The amount of weight they had gained was plotted on a large chart in different colors so it was easy to see. Students showed a great deal of interest in this project. In the final opinion poll, 68 students said this project had been helpful to them; 58 said it had made them more food conscious.

4. The home room program on food requirements that was presented to the 17 home room groups received favorable comment. Thirty-nine students said it gave them helpful information, 32 said it made them more food conscious, and 9 students reported that they tried some of the ideas at home.

Other favorable results followed the educational campaign. Seventy-eight students said they ate fewer bars and other sweets as a result of it, 57 talked about the food study at home, and 41 requested some special food to be served. Forty-five students said they had eaten a better lunch as a result (Table 7).

Table 7. Some results of educational campaign shown in percentages, second survey, matched group

	Ate a better breakfast	Ate a better lunch	Ate more green and yellow vegetables	Ate more citrus foods	Ate fewer bars	Talked about food at home	Requested some foods be served
Yes	60	29	55	68	59	49	33
No	40	71	45	32	41	51	67

Discussion

A survey of food habits, recently made at North Cache High School, helps to substantiate the theory that many teen-agers are undernourished.

A three day dietary of all students was taken and summarized. The results showed that very few students were eating leafy green and yellow vegetables, therefore, they were not getting vitamin A foods in sufficient amounts. Again it was evident that for some students vitamin C-rich foods were almost absent. In a tomato growing area this seems particularly unfortunate. Many students have an inadequate breakfast while many others, especially the girls, skip breakfast altogether. Bars, pop, and ice cream replace noon lunch for some students.

The girls of the home living classes attempted to bring these deficiencies to the attention of the students. This was done by means of posters, skits, a rat feeding experiment, home room programs, the school lunch program, exhibits, and films.

Some interesting results have occurred in connection with the study. Several departments in the school and most of the faculty members cooperated in putting the study over. At the request of the County School Lunch Supervisor, the study, as it related to the school lunch, was reported to the cooks of the county and again to lunch supervisors at a section meeting at the Utah Educational Association meetings. The girls who did the rat feeding experiment reported it to the sixth grade students in the Lewiston Elementary School. Several newspaper reports of the progress of the study have appeared in the county newspaper.

In conclusion it might be said that this study supports the idea that nutrition education is of value in bringing about desired changes in eating habits among high school students, especially when the students participate in the study. The need for such education is very great. At present there is much emphasis on scientific education, but these precious scientific minds need to be housed in good healthy bodies in order to do their best work. In fact no group of the population should be left out in an effort to improve the health and well being of the people as a whole. Particular emphasis needs to be given to the diets of our teen-age population, as these people seem to have the poorest diets of any group.

The job of nutrition education is a continuing one. We look forward to the day when we can reap the benefits of good nutrition and maintain buoyant good health. Probably few changes in food habits are needed to provide the people with an adequate diet, but those that are needed are important and we should use every available means to bring them about.

Being aware of the importance of the right food in our lives, and the value of eating the food we need, makes us helpful citizens of the world. Just as we are subject to fatigue, discontent, worry, and irritability when we don't have enough of the right food, so is the world. It is easy prey to any system that by word or deed offers food and with it the implied return to strength, security, happiness, and high morale.

SUMMARY

This study was undertaken for the purpose of finding whether or not nutrition education would bring about desired changes in the food habits of teen-agers. This study supports the thesis that education will produce desirable changes especially when the students help in the educational program.

Four hundred forty-two students participated in the study. The study was carried on by the teacher of the home living classes with the aid of about fifty girls from the home living classes.

A dietary survey was taken for 407 students. This survey revealed that 81 percent of the boys ate breakfast regularly and 51 percent of the girls. The others ate sometimes or seldom. None of the boys and 9 percent of the girls skipped breakfast entirely. The quality of the breakfasts of those who did eat it was far from satisfactory. Only 25 percent of the boys and 9 percent of the girls ate a good breakfast, while 15 percent of the boys and 45 percent of the girls ate a poor breakfast.

In the second survey, taken at the close of the educational campaign, improvement was shown in many ways. Then there were 3 percent fewer boys having a good breakfast but 4 percent more were having a fair breakfast than in the first survey. With the girls, where improvement was most needed, it occurred all along the line. There was a 2 percent gain in the number eating a good breakfast, 10 percent more were eating a fair breakfast, and 3 percent more were eating some breakfast.

The first survey revealed a marked deficiency in the intake of vitamin C-rich foods. Some improvement took place in the actual intake of ascorbic acid-rich foods in the second dietary survey but not nearly as much as the students thought they had made in the opinion poll. The first survey showed the intake of high-vitamin C food to be very low. The second dietary indicated that some improvement was made. However, some students had increased their consumption of these foods while others were getting less.

In the green and yellow vegetable intake, great improvement was shown. The boys and the girls of the matched groups had a 45 and 41 percent increase in having half a serving or more of green and yellow vegetables each day. Only 8 percent of all students had no green and yellow vegetables as compared to 32 percent in the first survey. The average size of the serving per person was increased from 0.36 to 0.66.

The check list for vegetable likes and dislikes showed corn to be liked by 80 percent of the students. Second in favor was lettuce, liked by 73 percent of the students, while carrots were liked by 70 percent. Green peppers, lima beans, and parsnips were listed as those vegetables they most disliked. Many of them had never tasted Brussels sprouts or broccoli.

Some other desirable results from the educational campaign were as follows. Many students said they had received helpful information or had become more food conscious. Forty-nine percent talked about the food project at home, others had requested some of the food be served at home, and some tried out the idea. Fifty-nine percent said they had eaten fewer bars and sweet snacks and 29 percent thought they had eaten a better lunch. For the duration of the study the whole school became more food conscious.

Recommendations for Further Study

This study could well be repeated with the students of only one or two teachers, such as the homemaking students and agricultural boys or boys physical education groups where a closer check could be made. The group was so large that it was difficult to supervise the keeping of the dietaries.

The school lunch people would like to have further studies done at the school to determine if education would improve conduct and manners in the lunch room.

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APPENDIX

APPENDIX SHEET 1

SURVEY TO DETERMINE FOOD HABITS OF TEEN-AGERS AT NORTH CACHE

Name_____Date_____ Town_____

Male ( ) Female ( ) Height_____Weight_____Age_____Grade_____

Do you live on a farm? ( ) In a town? ( )

People in your home: Father ( ) Mother ( ) Number of brothers ( )

Number of sisters ( ) List others who live in your home_____

Does your mother have a job outside the home? Yes ( ) No ( )

What do you consider your greatest health problems? (Check)

Overweight ( ) Underweight ( ) Acne (pimples) ( ) Constant fatigue ( )

Others ( ) If others is checked describe_____

How many school days have you missed due to illness since last Sept.?__

(check)

	Regularly	Sometimes	Seldom	Never
1. Do you eat breakfast?				
2. Do you eat the school lunch?				
3. Do you bring a lunch from home?				
4. Do you eat bars, ice cream, etc. at noon?				
5. Do you eat the evening meal, (or supper)?				

6. If you do not eat breakfast regularly check some of the reasons.
   Too little time ( ) Fear of overweight ( ) Too tired ( ) Not hungry ( )
   No breakfast prepared ( ) Don't like breakfast foods ( ) Others ( )
   List others_____
7. Do you feel tired before noon? Yes ( ) No ( )
8. Do you get very hungry before noon? Yes ( ) No ( )

If you do not eat the school lunch regularly check the reasons.
Too expensive ( ) Too fattening ( ) Not enough food ( )
Don't like the kind of food served ( ) Friends don't take it ( )
Don't like the way the food is prepared ( ) Others ( ) If others, please list_____

List any suggestions for the school lunch_____

If you do not eat a lunch at noon, check reasons.
Not hungry ( ) Rather play around ( ) No place to eat a lunch from home ( ) No time to prepare a lunch from home ( ) Others ( )
If you checked others, please list_____

APPENDIX SHEET 1 (Continued)

CHECK LIST TO DETERMINE FOOD LIKES AND DISLIKES

Following is a list of foods. Place the letter which describes how you feel about the food in column II.

Letters describing how you feel about the food.

O - Never tasted it.
X - Don't like it at all.
V - Like it very much.
F - Like it fairly well.
D - Don't know the food.
W - Wouldn't eat it at all.

1. Artichokes	36. Peaches
2. Asparagus	37. Pears
3. Green beans	38. Pineapple
4. Beet greens	39. Prunes
5. Broccoli	40. Milk
6. Brussels sprouts	41. Buttermilk
7. Cauliflower	42. Evaporated milk
8. Celery	43. Yellow or Swiss Cheese
9. Corn	44. Cottage cheese
10. Carrots	45. Beef
11. Lettuce	46. Pork
12. Green peppers	47. Veal
13. Spinach	48. Lamb
14. Pumpkin	49. Chicken
15. Sweet potatoes	50. Turkey
16. White potatoes	51. Sausage
17. Beets	52. Bacon
18. Peas	53. Hamburger
19. Onions	54. Fish
20. Green lima beans	55. Liver
21. Parsnips	56. Heart
22. White cabbage	57. Hot dogs
23. Red cabbage	58. Dried beans
24. Grapefruit	59. Dried peas
25. Lemonade	60. Soy beans
26. Oranges	61. Nuts
27. Tomatoes	62. White bread
28. Sauerkraut	63. Whole wheat bread
29. Strawberries	64. Cooked cereal
30. Avocados	65. Prepared cereal
31. Apples	66. Macaroni
32. Cantaloupe	67. Noodles
33. Cherries	68. Rice
34. Grapes	69. Butter
35. Bananas	70. Margarine

List 3 of your favorite vegetables. List 3 favorite ways of preparing them.

1. _____ _____
2. _____ _____
3. _____ _____

APPENDIX SHEET 1 (Continued)

FOOD INTAKE FOR ONE DAY

Name_____ _____

List everything you put into your mouth and swallowed

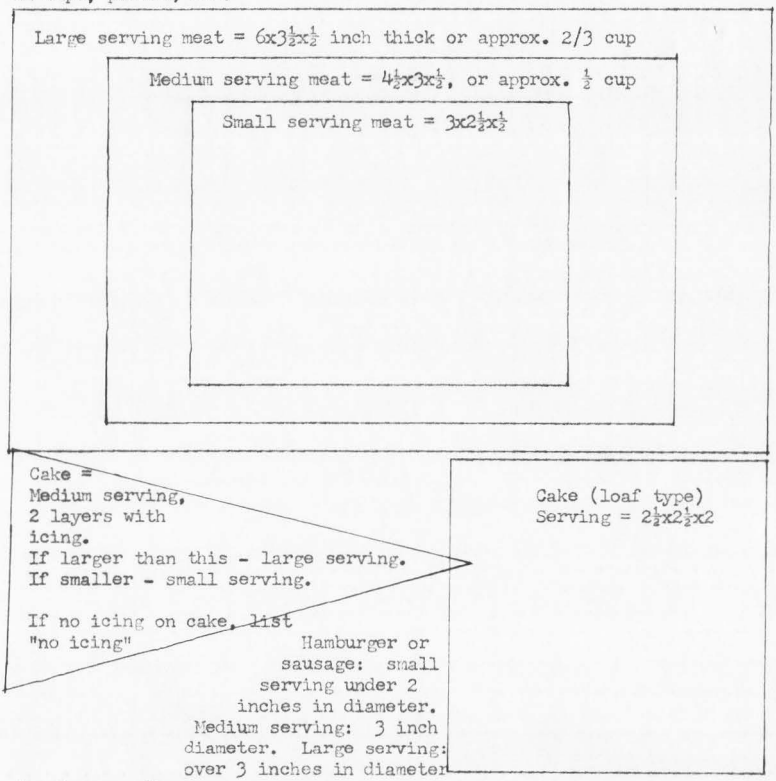
When	Food	Kind	Amount	How prepared
Example	Bread	Whole wheat	2 slices	Toasted, buttered
Breakfast				
Snacks between breakfast and lunch				
(check) School lunch () Lunch from home () Neither ()				
Snacks between lunch and supper				
Supper or dinner (After school meal)				
Snacks after supper				

Do you take a vitamin supplement such as cod liver oil or vitamin pills regularly? Yes (). No ().

APPENDIX SHEET 1 (Continued)

GENERAL INFORMATION ON DIETARY STUDY

Write down the exact amount of food you eat as nearly as you can. Tell amounts by cups (standard measuring cups) tablespoons, teaspoons. Tell how many slices or pieces, such as bread, 1 slice, grapes: 3. Use the sample sizes below to tell the size of servings not accountable in cups, pieces, etc.



Sample recording

When	Food	Kind	Amount	How prepared
Breakfast	Orange juice		½ cup	
	Cereal	Oatmeal	3/4 cup	Cooked
	Sugar	White	1 tea.	
	Milk	Whole	1½ cups	
	Bread	Whole wheat	1 slc.	Toasted
	Butter		1 tbs.	
	Eggs		1	Fried
	Bacon		1 slc.	Fried

APPENDIX SHEET 2

Name _____ Town _____

Male ( ) Female ( ) Year in School _____

Check your reaction to the following activities on food habits which have been taking place at North Cache in the last six weeks

	Didn't notice	Gave helpful information	Made me more conscious of food needs	Tried some of the ideas
Posters				
Films				
Radio skit				
Rat feeding project				
Home room bulletin				
Comic book				
Other (list)				

As a result of this educational campaign have you:

Eaten a better breakfast. Yes ( ) No ( )
Eaten a better lunch Yes ( ) No ( )
Eaten more green & yellow vegetables Yes ( ) No ( )
Eaten more citrus foods Yes ( ) No ( )
(Such as oranges, tomatoes, and cabbage)
Eaten fewer bars and sweet snacks Yes ( ) No ( )
Talked about food habits at home Yes ( ) No ( )
Requested any particular food to be served in your home. Yes ( ) No ( )

If you eat the school lunch, check your reaction to the following foods which have been served there in the last six weeks.

	First time served			Second time served		
	Liked	Disliked	Didn't Taste it	Liked	Disliked	Didn't Taste it
Broccoli						
Tomatoes						
Green peppers						
Liver						
Red & green cabbage salad						

List any plans you have for improving your food habits in the future.

Thank you for your cooperation.

APPENDIX SHEET 3

RATING FOR DAILY FOOD INTAKE

To classify total score:

1. If score on milk (Group 5) is 0, the diet is considered POOR, regardless of total score.

2. If total score is 22 or above, and score on milk is 2 or 3, the diet is considered GOOD.

3. If total is between 19 and 21 inclusive, and the score on milk is at least 1, the diet is considered FAIR.

4. A score of 18 or below is considered POOR.

APPENDIX SHEET 3 (Continued)

Food Groups	Number of Servings	Rating				Pupil Score
		0	1	2	3	
1. Green & yellow vegetables - some raw, some cooked or canned. Average serving considered: 2/3 c. cooked or 1 c. raw		none	one serv.	two serv.	three serv.	1.
2. Oranges, tomatoes, grapefruit, raw cabbage, or salad greens. Average serving: 1 orange, ½ grapefruit, 1 tomato, 1 c. raw greens, ½ c. cooked tomato, ½ c. juice.		none	one serv.	two serv.	three serv.	2.
3. Potatoes - Average serving: ½ c. cooked.		none	one serv.	two serv.	three serv.	3.
4. Other vegetables & fruits, raw, dried, cooked, or canned. Average serving: ½ c. cooked.		none	two serv.	four serv.	six serv.	4.
5. Milk & milk products, fluid, evaporated, dried milk, or cheese. Average serving: 1 c. fluid milk or 1 cu. in. cheese.		none	three serv.	six serv.	nine serv.	5.
6. Meat, fish, poultry, dried beans or peas, nuts or peanut butter. Average serving: 2 or 3 oz. meat, 4 tbs. peanut butter, 4-8 nuts, ½ c. cooked beans or peas		none	one serv.	two serv.	three serv.	6.
7. Eggs (or egg custard). Average serving: 1 egg.		none	one serv.	two serv.	three serv.	7.
8. Bread, flour, cereals - whole grain or enriched. Average serving: 1 sl. bread, ½ c. cooked cereal, 1 c. prepared cereal, 1 griddle cake or waffle.		none	three serv.	six serv.	nine serv.	8.
9. Butter or fortified margarine. Average serving: 1 tsp.		none	three serv.	six serv.	nine serv.	9.
					TOTAL SCORE	

Appendix Table 1. Results of questionnaire on breakfast habits of students

Subjects	Number	Eat breakfast regularly		Eat breakfast sometimes		Eat breakfast seldom		Eat breakfast never		No answer	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Boys matched group	55	41	75	10	18	1	2	0	-	-	-
Boys unmatched group	184	151	82	22	12	5	3	4	2	-	-
Girls matched group	101	55	54	35	34	11	11	0	-	-	-
Girls unmatched group	102	49	48	35	34	14	14	4	4	-	-
All boys	239	192	81	32	13	6	2	4	2	4	2
All girls	203	104	51	70	35	25	12	4	2	1	0.5
All students	442	296	67	102	23	31	7	8	2	5	1

Appendix Table 2. Breakfast ratings of matched groups

Rating	First survey		Second survey		Percent of difference
	Number	Percent	Number	Percent	
			All students		
Good	19	12.2	23	14.7	2.5
Fair	79	50.6	87	55.8	5.1
Poor	53	34.0	43	27.6	6.4
None	5	3.2	3	1.9	1.3
Total	156	100.0	156	100.0	
			Boys		
Good	10	18.2	12	21.8	3.6
Fair	35	63.6	35	63.6	0.0
Poor	10	18.2	7	12.7	5.4
None	0	0.0	1	1.9	1.9
Total	55	100.0	55	100.0	
			Girls		
Good	9	9.0	11	11.0	2.0
Fair	44	43.5	52	51.4	8.0
Poor	43	42.5	36	35.6	7.0
None	5	5.0	2	2.0	3.0
Total	101	100.0	101	100.0	

Appendix Table 3. Breakfast ratings of 407 students in the first survey

Rating	All students		Boys		Girls	
	Number	Percent	Number	Percent	Number	Percent
Good	70	17.2	53	25.0	17	8.7
Fair	209	51.4	128	60.0	81	41.6
Poor	119	29.2	31	15.0	88	45.1
None	9	2.2	0	0	9	4.6
Total	407	100.0	212	100.0	195	100.0

Appendix Table 4. Rating of total food intake of matched groups

Rating	First survey		Second survey		Percent of difference
	Number	Percent	Number	Percent	
			All students		
Good	27	17.3	48	30.8	13.5
Fair	48	30.8	60	38.4	7.6
Poor	81	51.9	48	30.8	21.1
Total	156	100.0	156	100.0	
			Boys		
Good	15	27.4	23	41.8	14.4
Fair	20	36.3	21	38.2	1.9
Poor	20	36.3	11	20.0	16.3
Total	55	100.0	55	100.0	
			Girls		
Good	12	11.8	25	24.7	12.9
Fair	28	27.9	39	38.6	10.6
Poor	61	60.4	37	36.7	23.7
Total	101	100.0	101	100.0	

Appendix Table 5. Rating of total food intake for all students

Rating	All students		Boys		Girls	
	Number	Percent	Number	Percent	Number	Percent
Good	89	22.0	61	29.0	28	14.0
Fair	138	34.0	86	40.4	52	26.6
Poor	180	44.0	65	30.6	115	59.4
Total	407	100.0	212	100.0	195	100.0

Appendix Table 6. Daily intake of high-vitamin C foods and green and yellow vegetables, first survey, 407 students

Daily servings	All students		Boys		Girls	
	Number	Percent	Number	Percent	Number	Percent
			High-vitamin C Foods			
1 or more	98	24.1	51	24.1	47	24.2
Some (0.1 to 0.9)	152	37.4	64	30.4	88	45.0
None	157	38.5	97	45.5	60	30.8
Total	407	100.0	212	100.0	195	100.0
			Green and Yellow Vegetables			
0.5 or more	130	32	54	25	76	39
Some (0.1 to 0.4)	147	36	82	39	65	33
None	130	32	76	36	54	28
Total	407	100	212	100	195	100

Appendix Table 7. Daily intake of high-vitamin C foods of students of the matched groups

Daily servings	First survey		Second survey		Percent of difference
	Number	Percent	Number	Percent	
		All students			
1 or more	32	21	51	33	12
Some (0.1 to 0.9)	68	43	36	23	19
None	56	36	69	44	8
Total	156	100	156	100	
		Boys			
1 or more	10	18	14	26	8
Some (0.1 to 0.9)	20	36	10	18	18
None	25	46	31	56	10
Total	55	100	55	100	
		Girls			
1 or more	22	22	37	36	14
Some (0.1 to 0.9)	48	47	26	26	21
None	31	31	38	38	7
Total	101	100	101	100	

Appendix Table 8. Daily intake of green and yellow vegetables of students of the matched groups

Daily servings	First survey		Second survey		Percent of difference
	Number	Percent	Number	Percent	
		All students			
0.5 or more	48	31	115	74	43
Some (0.1 to 0.4)	58	37	3	2	35
None	50	32	38	24	8
Total	156	100	156	100	
		Boys			
0.5 or more	13	24	38	69	45
Some (0.1 to 0.4)	19	35	0	0	35
None	23	41	17	31	10
Total	55	100	55	100	
		Girls			
0.5 or more	35	35	77	76	41
Some (0.1 to 0.4)	39	39	3	3	36
None	27	26	21	21	5
Total	101	100	101	100	

Appendix Table 9. Students' likes and dislikes for vegetables and liver

Vegetables	Like it very much	Disliked it	Never tasted
Asparagus	92	87	40
Green beans	160	21	0
Beet greens	71	67	71
Broccoli	23	48	126
Brussels sprouts	31	37	141
Cauliflower	53	100	48
Celery	241	22	34
Corn	307	4	0
Carrots	264	9	1
Lettuce	274	9	2
Green peppers	86	107	25
Spinach	137	91	3
Pumpkin	175	50	6
Sweet potatoes	239	51	4
White potatoes	226	6	0
Beets	127	6	2
Peas	227	10	0
Onions	121	59	1
Green lima beans	64	116	69
Parsnips	56	122	42
White cabbage	115	74	33
Red cabbage	55	76	82
Liver	141	104	4